

61. (New) The composition according to claim 57, wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride.
62. (New) An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water, wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride and an etch rate greater than about 1000 Å/minute for cobalt.
63. (New) The composition according to claim 62, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.

Remarks

The Office Action mailed December 28, 2000 has been received and reviewed. Claims 37-39 have been amended. Claim 36 has been cancelled. Claims 46-63 have been added. The pending claims are claims 37-39 and 46-63.

Information Disclosure Statement

Applicants submitted an Information Disclosure Statement on October 6, 2000. Applicant received the Form 1449 from the Examiner without initialization of two articles (Goto et al. and Ohguro et al.). Copies of the Information Disclosure Statement, the two articles, Form 1449, transmittal document, and date-stamped itemized postcard are attached herewith. Consideration of the two articles listed on the attached 1449 form is respectfully requested. Pursuant to the provisions of M.P.E.P. § 609, Applicants further requests that a copy of the 1449 form, marked as being considered and initialed by the Examiner, be returned with the next Official Communication.

The 35 U.S.C. § 102(b) Rejection

The Examiner rejected claims 36 and 37 under 35 U.S.C. § 102(b) as being anticipated by Williams et al. (U.S. Patent No. 4,875,972). Specifically, the Examiner alleges that Williams

describes an etching composition comprising HCl, hydrogen peroxide, and deionized water.

Applicants respectfully traverse this rejection.

However, to move this case to issuance, Applicants have cancelled claim 36, rendering the Examiner's rejection moot. Applicants have also amended claim 37 so that it now depends from claim 38, which has been written in independent form.

For a claim to be anticipated under 35 U.S.C. § 102(b), each and every element of the claim must be found in a single prior art reference. *See* M.P.E.P. § 2131.

Claim 38, from which amended claim 37 depends, recites a composition that includes a ratio of mineral acid:peroxide:deionized water in a range of about 1:1:35 to about 1:1:5. As stated by the Examiner, Williams et al. does not teach this ratio. Therefore, Williams et al. does not contain each and every element of claim 37 and cannot anticipate thereof.

Further, as claim 37 is dependent on claim 38, it recites all the limitations thereof. Therefore, for at least the above reason, Claim 37 is also not anticipated by Williams et al. Reconsideration and withdrawal of this rejection is, therefore, respectfully requested.

The 35 U.S.C. § 103 Rejection

The Examiner rejected claims 38 and 39 under 35 U.S.C. § 103(a) as being unpatentable over Williams et al., and further in view of Hayashi et al. (U.S. Patent No. 5,482,895). Specifically, the Examiner alleges that, although Williams et al. does not describe the claimed ratios, Hayashi et al. teaches using a copper etchant having a ratio of mineral acid:peroxide of either 1:1 or 3:1. The Examiner alleges that it would have been obvious for one of skill in the art at the time of the invention to determine the optimum ratio of the etchant's components depending upon the type of material being etched and through experimentation with an anticipation of an expected result. Applicants respectfully traverse this rejection.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success.

Finally the prior art references must teach or suggest all the claim limitations. *See* M.P.E.P. § 2143.

Claim 38, and claim 39, which depends thereon, are not obvious in view of the cited references for various reasons. For example, the combination of Williams et al. and Hayashi et al. does not teach or suggest all of the claim limitations. Claim 38 recites an etching composition that includes a ratio of mineral acid:peroxide:deionized water in a range of 1:1:35 to about 1:1:5. As mentioned above, Williams does not describe this ratio. Further, Hayashi et al. teaches an etching composition of HCl and hydrogen peroxide in a ratio of 1:1, and a composition of sulfuric acid and hydrogen peroxide in a ratio of 3:1. As such, Hayashi et al. also does not teach a composition of mineral acid, peroxide, and deionized water in the ratio described in the claims. Therefore, the combination of the cited references does not teach or suggest all the claim limitations of claims 38 and 39.

Further, there is no motivation or suggestion to combine Williams et al. with Hayashi et al. to provide a ratio of components as described in claims 38-39. For example, Williams et al. teaches a rather dilute composition of 600 ml of deionized water, 150 ml of 15 weight percent aqueous sulfuric acid, and 50 ml of 50 weight percent active aqueous hydrogen peroxide to etch metals and alloys. *See* Williams et al., Column 5, lines 16-21. Hayashi et al., on the other hand, teaches more concentrated compositions of HCl and hydrogen peroxide and sulfuric acid and hydrogen peroxide. *See* Hayashi et al., Column 10, lines 53-55. Therefore, there would have been no motivation or suggestion to modify the teachings of Williams with those of Hayashi et al., as the Williams et al. composition would be made with a higher hydrogen peroxide and acid content, which is directly opposite of the more dilute composition according to the present invention. Further, neither Williams et al. nor Hayashi et al. recognize the problems or advantages of removing cobalt and a metal nitride with a single solution. In fact, Hayashi et al. directly teaches away from such a composition by its use of one solution for cobalt and another for metal nitride.

For the above reasons, Applicants respectfully submit that claims 38 and 39 are patentable over Williams et al. and Hayashi et al. Reconsideration and withdrawal of the rejection are, therefore, respectfully requested.

New Claims

New claims 46-63 have been added to more accurately and fully claim the present invention. As a result, no new matter has been added.

Summary

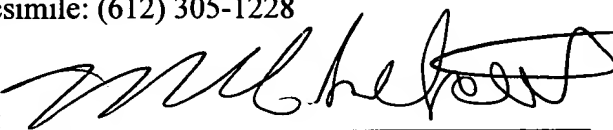
It is respectfully submitted that the pending claims are now in condition for allowance and notification to that effect is respectfully requested. The Examiner is invited to contact Applicants' Representatives, at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

Respectfully submitted,

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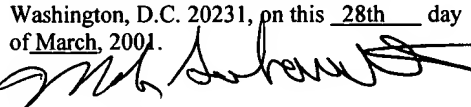
28 March 2001
Date

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CERTIFICATE UNDER 37 C.F.R. 1.8:

The undersigned hereby certifies that this paper is being deposited in the United States Postal Service, as first class mail, in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231, on this 28th day of March, 2001.


Mark J. Gebhardt



**APPENDIX A - CLAIM AMENDMENTS INCLUDING NOTATIONS TO INDICATE
CHANGES MADE**

Serial No.: 09/560,268

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37. **(Once Amended)** The etching composition according to claim [36] 38, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.
38. **(Once Amended)** [The composition according to claim 36,] An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water at [wherein the composition includes] a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water).
39. **(Once Amended)** The composition according to claim 38, wherein the [composition includes a] ratio is in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).
46. **(New)** The composition according to claim 38, wherein the mineral acid is selected from a group consisting of HCl, HNO₃, H₂SO₄, H₃PO₄, and HF.
47. **(New)** An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water at a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water), wherein the composition has an etch rate greater than about 1000 Å/minute for cobalt.
48. **(New)** The etching composition according to claim 47, wherein the mineral acid is HCl.

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49. (New) The etching composition according to claim 47, wherein the peroxide is hydrogen peroxide.
50. (New) The composition according to claim 47, wherein the ratio is in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).
51. (New) The composition according to claim 47, wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride.
52. (New) An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water at a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water), wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride.
53. (New) The etching composition according to claim 52, wherein the mineral acid is HCl.
54. (New) The etching composition according to claim 52, wherein the peroxide is hydrogen peroxide.
55. (New) The composition according to claim 52, wherein the ratio is in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).
56. (New) An etching composition, the composition consisting essentially of a mineral acid, a peroxide, and deionized water.

57. (New) The composition according to claim 56, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.
58. (New) The composition according to claim 57, wherein the composition comprises a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water).
59. (New) The composition according to claim 58, wherein the ratio is in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).
60. (New) The composition according to claim 56, wherein the mineral acid is selected from a group consisting of HCl, HNO₃, H₂SO₄, H₃PO₄, and HF.
61. (New) The composition according to claim 57, wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride.
62. (New) An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water, wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride and an etch rate greater than about 1000 Å/minute for cobalt.
63. (New) The composition according to claim 62, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.